St Ivo Academy

Design and Technology Department

Clock Project

Knowledge Organiser

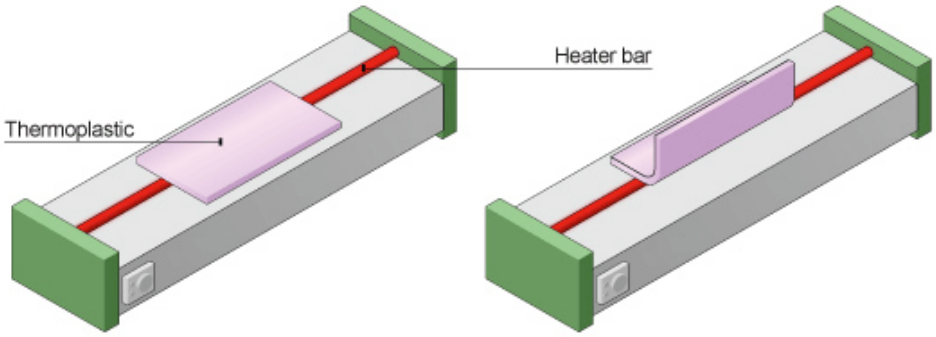
What is the raw material for plastics?

The main material is crude oil.

What am I learning?

How the hot strip heater is used to bend acrylic in the school workshop.

Line bending is a process whereby acrylic is bent using a hot wire strip heater. Before bending the acrylic, it is important that the line being folded is marked out. A steel ruler is used to mark along the edge of the acrylic and a try square is used to mark a 90° line across the plastic.



Step 1 – Turn on the strip heater and give it sufficient time to heat up.

Step 2 – Take the acrylic (marked out) and place the line on top of the hot wire strip/element.

Step 3 – You must be careful when checking the plastic, as your fingers can easily come into contact with the hot wire strip. After a few minutes the plastic will become flexible.

Step 4 – Keep checking that the plastic has been properly heated before getting ready to bend it. If it is not properly heated then the plastic could snap/crack when bending it.

Step 5 – When the plastic is ready, carefully remove it from the strip heater.

Step 6 – Using a jig bend the plastic around it.

Step 7 – Allow the plastic to cool before removing it from the jig.

Important safety points when using a strip heater.

ALWAYS tie hair back when using the strip heater. Hair can easily come into contact with the hot wire strip.

Wear protective gloves when handling the hot plastic and placing it on and off the strip heater. The hot wire and plastic can become extremely hot!!!!!

Advantages of using acrylic

1. Strength and durability.
2. Highly transparent .
3. Easy to fabricate.
4. Lightweight.
5. Stronger than glass.

Disadvantages of using acrylic

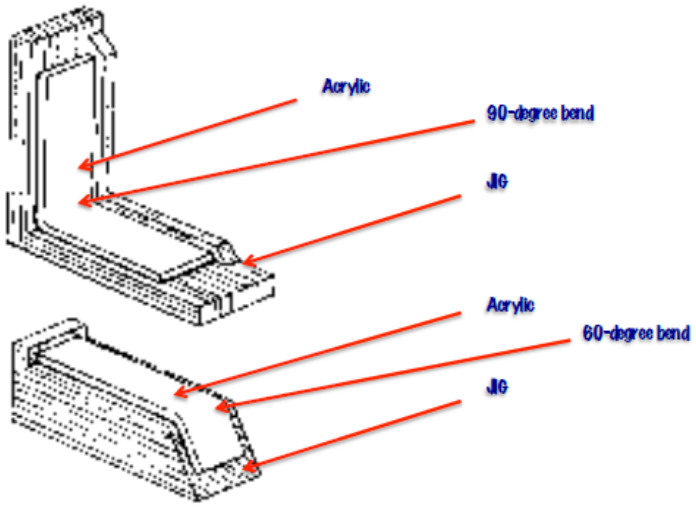
1. Not heat-resistant .
2. More liable to scratching than glass.
3. Brittle.
4. Not sustainable (finite resource).

What is a Jig?

A Jig can be used for achieving the required bend in plastic. It is a lot more accurate than doing it by hand an eye.

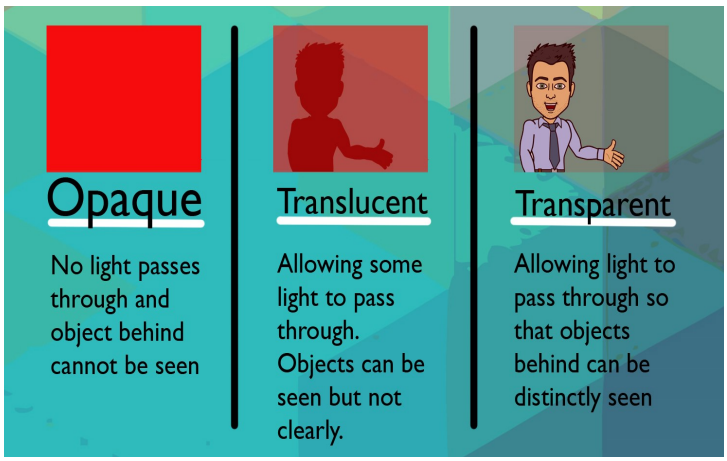
The Jig below (JIG 1) is used for forming plastic at 90 degrees. The JIG is normally made from wood. It can be used over and over again, therefore if you are making a batch of a particular product, all the bends would be accurate and consistent.

JIG 2 is used for bending plastic at 60 degrees.



Why Plastics?

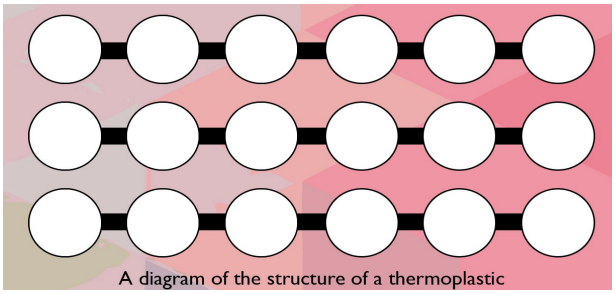
What does plastic look like?



Plastic Theory

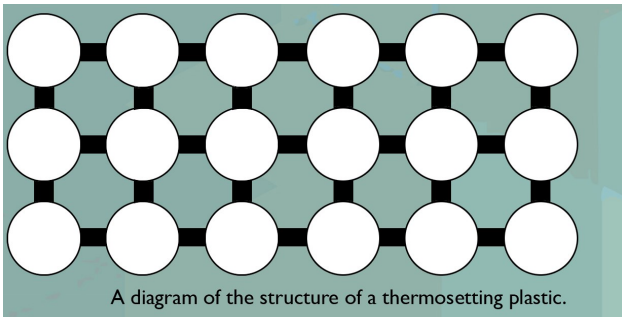
Thermoplastics

Thermoplastics soften when they are heated and can be shaped when hot. The plastic will harden when it has cooled, but it can be reshaped if heated again.


A diagram of the structure of a thermoplastic

Thermosetting

Thermosetting plastics are heated and moulded into shape. They cannot soften if reheated, because the polymer chains become interlinked during the moulding process.


A diagram of the structure of a thermosetting plastic.

What do I know about the tools I will use in this project?